

A Review Paper on Face Recognition Techniques

Abstract: The purpose of this paper is to review various face detection and recognition methods, Face recognition has been a fast growing, and Face Recognition is the problem related to the field of machine learning, challenging and interesting area in real time application. Computer vision and image analysis. Paper an effort is made to review an extensive range of present methodology of face recognition techniques

Keywords: Face recognition Techniques, Face Detection, Feature Extraction, Application

I. Introduction

Face recognition is an important part of the capability of human perception system and is a routine task for humans, while building a similar computational model of face recognition.

In the advanced technological epoch, security issues are on the verge of risk as high rate of crimes under technical hands has been inclining with the passage of time. The locality preserving projection is likely to be of particular use in information reclamation applications. If one wishes to retrieve video forms under a vector space model, then one will eventually need to do a nearest neighbour search in the low dimensional space. Many researchers believe that

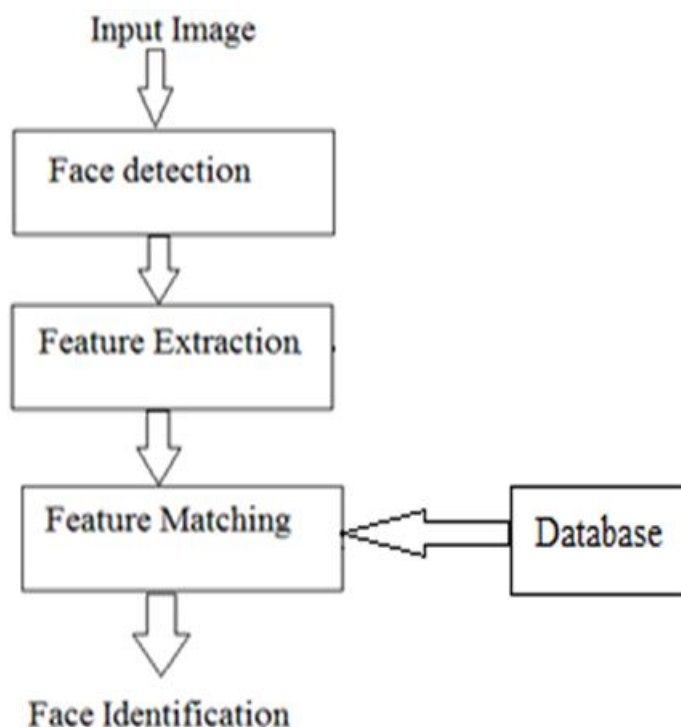


Fig. Face Recognition System

Face recognition need to be about face detection, the prior step to face recognition, the accurate detection of human faces in arbitrary scenes, is the most important process involved. Human faces are remarkably similar in global properties, including size, aspect ratio, and location of main features, but can vary considerably in details across individuals, gender, race, or due to facial expression

The face detection procedure bonds with haar features of human face. A simple feature is used in detection algorithm. In this paper the importance is given to the features than the numerical pixels because features can be used to represent both the statistically close facial information and lightly related background data sample image. The simplest form the features can be thought of as pixel intensity set estimations. This is where the sum of the luminance of the pixels in the white region of the feature is subtracted from the sum of the luminance in the remaining gray section

II. Face Recognition Techniques

A. Face Detection

As the name suggests, it is the detection of the face. In this phase, faces are detected in the image. To detect the face from the image there are four methods:

1) Knowledge-based Method

The rule-based method uses the knowledge of human to get the information about the typical face. Usually, the rules capture the relationships between facial features to design the location of the features in the face.

2) Template Matching Method

In this, several standard patterns of a face are stored in the database or the system to describe the face as a whole or the facial features separately. The link between an input image and the stored patterns are evaluated for detection. These methods have been used for both face localization and detection.

3) Appearance based Method

In contrast to template matching, the models are learned from a set of training images which should capture the representative variability of the appearance face. These learned models are then used for detection and are mainly designed for face detection.

4) Block rank patterns

In this, a block rank pattern is generated by dividing two gradient magnitude images into nine(3×3) blocks and then a face is roughly detected by these 3×3 block rank patterns generated from the gradient magnitude images.

B. Feature Extraction

It is the extraction of features like eyes, nose and lips from the face which can be used further to differentiate people from each other. The approaches for face extraction are:

1) DCT (Discrete Cosine Transform)

The Discrete Cosine Transform expresses a sequence of data points in terms of a sum of cosine functions oscillating at different frequencies. Therefore, it can be used to transform images, compact the variations and allows an effective dimensionality reduction. They have been widely used for data compression.

2) JPEG (DCT Zigzag)

It is the scanning technique which moves in the zigzag form and from low frequency component to high frequency component because most of the energy is stored in low frequency component.

3) Gabor Filter

A set of Gabor filters with different frequencies and orientations may be useful for extracting important features from an image. They have been widely used in pattern analysis applications

4) PCA (Principle Component Analysis)

Principle Component Analysis is a mathematical procedure that performs a dimensionality reduction by extracting the principle components of the multi-dimensional data. It is based upon Eigenvector and a linear map. . the cases, an artificial neural network is an adaptive system that changes its structure based on external or internal information that flows through the network.

4) SOM (Self-Organizing Map)

Self-Organizing Map (SOM) belongs to the competitive learning networks. It is a kind of a neural network which is trained by using unsupervised learning to produce a two dimensional (2-D) representation of the input space of the training samples.

Applications

There are various areas in which face recognition system is used:

A) Entertainment

In the area of entertainment it can be used in the monitoring of the behaviour at childcare or old people's centres, human-robot/computer-interaction, video gaming and virtual reality etc.

B) Information Security

In the area of information Security, it can be used as personal device logon, border checkpoints, database security, file encryption, intranet security, medical records, and banks, biometric-log-in.

C) Smart Cards

As smart cards it may be used as drivers' licenses, passport, employee's ID, immigration, bar code or magnetic stripe, national ID, aadhaar Cards, voter card.

D) Law Enforcement and Surveillance

It is also used in advanced video surveillance, traffic control, ATM machines, and enhancement of CCTV images, police bookings, suspect tracking and investigation.

III. Conclusion:

A face detection method based on cost-sensitive Ada Boost is presented in the paper. This paper has attempted to review a significant number of papers to cover the recent development in the field of face recognition. Current face recognition systems have already reached a certain level of maturity when operating under constrained conditions. The list of references is provided to gain more complete understanding.

References:

- [1]. Shou-Jen Lin, Chao-Yang Lee, Mei-hsuan Chao, Chi-Sen Chiou, Chu-Sing Yang, „The Study And Implementation Of Real-Time Face Recognition And Tracking System“, Proceedings of the Ninth International Conference on Machine Learning and Cybernetics, Qingdao, 11-14 July 2010.
- [2]. Sarala A. Dabhade & Prof. Mrunal S. Bewoor „, Real Time Face Detection and Recognition using Haar - Based Cascade Classifier and Principal Component Analysis“ International Journal of Computer Science and Management Research Vol 1 Issue 1 Aug 2012 ISSN: 2278-733X.
- [3]. Yun-Hee Han, Keun-Chang Kwak, „Face Recognition and Representation by Tensor based MPCA Approach“, 2010 The 3rd International Conference on Machine Vision (ICMV 2010)
- [4]. Seema Asht, Rajeshwar Dass, Dharmendar, „Pattern Recognition Techniques“, International Journal of Science, Engineering and Computer Technology, vol. 2, pp. 87-88, March 2012.
- [5]. Ambika Ramchandra and Ravindra Kumar, „Overview Of Face Recognition System Challenges,“ International Journal of Scientific & Technology Research (IJSTR), vol. 2, issue 8, Aug. 2013.
- [6]. Abhijeet Kumar Sinha, K.K. Shukla, „A Study of Distance Metrics in Histogram Based Image Retrieval“, International Journal of Computers & Technology (IJCT), vol. 4 No. 3. March-April, 2013, ISSN 2277-3061.
- [7]. Asavari G. Joshi and A. S. Deshpande, „Review of Face Recognition Techniques“, International Journal of Advanced Research in Computer Science and Software Engineering, vol. 5, Issue no. 1, 2015.
- [8]. Bartoli, A (2006) "Group wise Geometric and Photometric Direct Image Registration," Proc. 17th British Machine Vision Conf., Sept. 2006.
- [9]. Dyar. C.R (1994) "Global surface reconstruction by purposive control of observer motion", Computer Vision and Pattern Recognition, 1994. Proceed in
- [10]. Farrukh Sayeed, M. Hanmandlu, and A.Q. Ansari, „Face Recognition using Segmental Euclidean Distance“, Defence Science Journal, Vol. 61, No. 5, September 2011, pp. 431-442.